METHOD AND APPARTUS FOR CONTROLLABLY EFFECTING SAMPLES USING TWO SIGNALS Carlton F. Brooks Filed 12-Nov-02 QIPLG Attorney Docket No.: 01-057810US; SJL Tel No. 510-337-7871 5/11  $\begin{array}{c} \textit{Chip} \\ \sim 10 \; \text{M} \, \Omega \end{array}$ AC Voltage up to 3000 V<sub>rms</sub> at 10 kHz to heat fluid in narrow section DC Voltage to move fluid on chip Zener Diode to protect the Lock-In **Filters** from high voltages to have DC and high frequency currents (>1 µA) bypass the lock-in amplifier 100 k-Ohm 22 µF 17 nF  $1 \text{ k}\Omega$ 20 nF 1 k $\Omega$ 25 nF  $1 \text{ k}\Omega$ 33 nF  $1 k\Omega$ 50 nF  $1 \text{ k}\Omega$ 100 nF 1 V<sub>rms</sub> Sine Ground ĂΊ 10 Hz Out (float) Lock-In Amplifier to measure the conductivity/temeprature  $50 \Omega$ 1 kΩ without inducing flow

FIG. 4B